IN THE CLAIMS:

Claims 1-19 (cancelled)

Claim 20 (currently amended) A prosthetic system for ~~alleviating phantom limb pain and selectively delivering stimulation signals to~~ a patient having a limb stump, comprising:

a prosthetic limb that is attachable to the patient's limb stump, the prosthetic limb including a plurality of sensors that produce sensory signals;

a signal generator for producing electrical stimulation signals to stimulate one or more selected sensory nerve fibers of a severed limb nerve, the electrical stimulation signals ~~being in the form of impulses having a duration in the range of about 10 to 1000μs and a current amplitude selected to be 1-10 times a current threshold required to recruit a large diameter sensory nerve fiber without recruiting a pain nerve fiber, and~~ approximating a pattern of sensations that would be received from a normal, innervated limb before it was amputated;

a microprocessor that receives the sensory signals and is programmed to cause the signal generator to produce the electrical stimulation signals and to deliver the electrical stimulation signals to the one or more selected sensory nerve fibers in order to provide sensations to the patient that appear to arrive from the prosthetic limb, wherein the selection of the one or more sensory nerve fibers is based on feedback from the patient regarding which sensory nerve fibers correspond to which of the plurality of sensors, the microprocessor being programmed to cause the signal generator to produce electrical stimulation signals in the absence of sensory signals produced by the plurality of sensors in order to alleviate phantom limb pain;

means for transmitting the sensory signals from the plurality of sensors to the microprocessor; and

means for transmitting the electrical stimulation signals to the selected sensory nerve fibers;

wherein the means for transmitting the electrical stimulation signals to the selected sensory nerve fibers includes a plurality of electrodes adapted for implantation in close proximity to the severed limb nerve and wherein each electrode is in close proximity to different sensory nerve fibers of the severed limb nerve.

Claim 21 (previously presented) The system of Claim 20, wherein the selection of the electrical stimulation signals is based on feedback from the patient.

Claim 22 (canceled)

Claim 23 (previously presented) The system of Claim 20, wherein the signal generator and microprocessor are adapted for location outside the body.

Claim 24 (previously presented) The system of Claim 20, wherein the signal generator and microprocessor are adapted for location inside the prosthetic limb.

Claim 25 (previously presented) The system of Claim 20, wherein the signal generator and microprocessor are adapted for location inside the body.

Claim 26 (previously presented) The system of Claim 20, wherein the signal generator and microprocessor are adapted for location inside the limb stump.

Claim 27 (previously presented) The system of Claim 20, wherein the plurality of sensors sense any of touch, pressure, force, slip, joint position or temperature.

Claim 28 (previously presented) The system of Claim 20, wherein the means for transmitting the electrical stimulation signals is telemetric.

Claim 29 (previously presented) The system of Claim 28, wherein the telemetric transmission means includes a transmitting antenna coupled to the signal generator and a receiving antenna coupled to the electrodes.

Claim 30 (canceled)

Claim 31 (previously presented) The system of Claim 20, wherein the means for transmitting the electrical stimulation signals includes cables extending between the one or more electrodes and the signal generator.

Claim 32 (canceled)

Claim 33 (previously presented) The system of Claim 20, wherein the electrical stimulation signals are monophasic.

Claim 34 (previously presented) The system of Claim 20, wherein the electrical stimulation signals are biphasic.

Claim 35 (canceled)

Claim 36 (previously presented) The system of Claim 20, wherein the signal generator can adjust the amplitude of the electrical stimulation signals.

Claim 37 (previously presented) The system of Claim 20, wherein the signal generator can adjust the frequency of the electrical stimulation signals.

Claim 38 (previously presented) The system of Claim 20, wherein the electrodes are incorporated within an insulating nerve cuff that when implanted, circumferentially surrounds

the severed limb nerve, wherein each electrode in the nerve cuff is in close proximity to different sensory nerve fibers of the severed limb nerve.

Claim 39 (previously presented) The system of Claim 38, wherein the nerve cuff is a multi-chambered, tubular nerve cuff including a number of parallel ridges that provide insulation between electrodes.

Claim 40 (previously presented) The system of Claim 20, further comprising a nerve cuff that when implanted surrounds the severed limb nerve, the nerve cuff having a number of isolated chambers and a catheter associated with each chamber for selectively delivering pharmacological agents to sensory nerve fibers of the severed limb nerve and wherein the means for delivering the electrical stimulation signals to the selected nerve fibers causes a pharmacological agent to be delivered in one or more of the catheters.

Claim 41 (previously presented) The system of Claim 20, wherein the means for transmitting the electrical stimulation signals to the sensory nerve fibers in the limb stump include an optical transmission link.

Claim 42 (previously presented) A system for alleviating phantom limb pain of a patient having a limb stump, comprising:

a signal generator for producing electrical stimulation signals to stimulate one or more selected sensory nerve fibers of a severed limb nerve, the electrical stimulation signals being in the form of impulses having a duration in the range of about 10 to 1000μs and a current amplitude selected to be 1-10 times a current threshold required to recruit a large diameter sensory nerve fiber without recruiting a pain nerve fiber, and approximating a pattern of sensations that would be received from a normal, innervated limb before it was amputated;

a microprocessor that is programmed to cause the signal generator to produce the electrical stimulation signals and to deliver the electrical stimulation signals to one or more selected sensory nerve fibers in order to alleviate phantom limb pain, wherein the selection of the electrical stimulation signals is based on feedback from the patient; and

means for transmitting the electrical stimulation signals to the selected sensory nerve fibers;

wherein the means for transmitting the electrical stimulation signals to the selected sensory nerve fibers includes a plurality of electrodes adapted for implantation in close proximity to the severed limb nerve and wherein each electrode is in close proximity to different sensory nerve fibers of the severed limb nerve.

Claim 43 (canceled)

Claim 44 (previously presented) The system of Claim 42, wherein the signal generator and microprocessor are adapted for location outside the body.

Claim 45 (previously presented) The system of Claim 42, wherein the signal generator and microprocessor are adapted for location inside the body.

Claim 46 (previously presented) The system of Claim 42, wherein the signal generator and microprocessor are adapted for location inside the limb stump.

Claim 47 (previously presented) The system of Claim 42, wherein the means for transmitting the electrical stimulation signals is telemetric.

Claim 48 (previously presented) The system of Claim 47, wherein the telemetric transmission means includes a transmitting antenna coupled to the signal generator and a receiving antenna coupled to the electrodes.

Claim 49 (previously presented) The system of Claim 42, wherein the means for transmitting the electrical stimulation signals includes cables extending between the one or more electrodes and the signal generator.

Claim 50 (canceled)

Claim 51 (previously presented) The system of Claim 42, wherein the electrical stimulation signals are monophasic.

Claim 52 (previously presented) The system of Claim 42, wherein the electrical stimulation signals are biphasic.

Claim 53 (canceled)

Claim 54 (previously presented) The system of Claim 42, wherein the signal generator can adjust the amplitude of the electrical stimulation signals.

Claim 55 (previously presented) The system of Claim 42, wherein the signal generator can adjust the frequency of the electrical stimulation signals.

Claim 56 (previously presented) The system of Claim 42, wherein the electrodes are incorporated within an insulating nerve cuff that when implanted, circumferentially surrounds the severed limb nerve, wherein each electrode in the nerve cuff is in close proximity to different sensory nerve fibers of the severed limb nerve.

Claim 57 (previously presented) The system of Claim 56, wherein the nerve cuff is a multi-chambered, tubular nerve cuff including a number of parallel ridges that provide insulation between electrodes.

Claim 58 (previously presented) The system of Claim 42, further comprising a nerve cuff that when implanted surrounds the severed limb nerve, the nerve cuff having a number of isolated chambers and a catheter associated with each chamber for selectively delivering pharmacological agents to sensory nerve fibers of the severed limb nerve and wherein the means for delivering the electrical stimulation signals to the selected nerve fibers causes a pharmacological agent to be delivered in one or more of the catheters.

Claim 59 (previously presented) The system of Claim 42, wherein the means for transmitting the electrical stimulation signals to the sensory nerve fibers in the limb stump include an optical transmission link.

Claim 60 (currently amended) A method of alleviating phantom limb pain and providing sensory feedback ~~selectively delivering stimulation signals~~ to a patient having a limb stump, comprising the steps of:

providing the patient with a prosthetic limb that is attachable to the patient's limb stump, the prosthetic limb including a plurality of sensors that produce sensory signals;

processing the sensory signals produced by the plurality of sensors;

generating electrical stimulation signals ~~in the form of impulses having a duration in the range of about 10 to 1000μs and a current amplitude selected to be 1-10 times a current threshold required to recruit a large diameter sensory nerve fiber without recruiting a pain nerve fiber, the electrical stimulation signals~~ approximating a pattern of sensations that would

be received from a normal, innervated limb before it was amputated, in response to the processed sensory signals;

generating electrical stimulation signals in the absence of sensory signals produced by the plurality of sensors to alleviate phantom limb pain in the absence of sensory signals; and

delivering the electrical stimulation signals to the one or more selected sensory nerve fibers in order to provide sensations to the patient that appear to arrive from the prosthetic limb, wherein the selection of the one or more sensory nerve fibers is based on feedback from the patient regarding which sensory nerve fibers correspond to which of the plurality of sensors.

Claim 61 (previously presented) The method of Claim 60, wherein the selection of the electrical stimulation signals is based on feedback from the patient.

Claim 62 (canceled)

Claim 63 (previously presented) The method of Claim 60, wherein the plurality of sensors sense any of touch, pressure, force, slip, joint position or temperature.

Claim 64 (canceled)

Claim 65 (previously presented) The method of Claim 60, wherein the electrical stimulation signals are monophasic.

Claim 66 (previously presented) The method of Claim 60, wherein the electrical stimulation signals are biphasic.

Claim 67 (canceled)

Claim 68 (previously presented) The method of Claim 60, further comprising the step of adjusting the amplitude of the electrical stimulation signals.

Claim 69 (previously presented) The method of Claim 60, further comprising the step of adjusting the frequency of the electrical stimulation signals.

Claims 70-77 (canceled)

Claim 78 (previously presented) The system of Claim 33, wherein the monophasic electrical stimulation signals are negative going.

Claim 79 (previously presented) The system of Claim 34, wherein the biphasic electrical stimulation signals are negative/positive going.

Claim 80 (previously presented) The system of Claim 51, wherein the monophasic electrical stimulation signals are negative going.

Claim 81 (previously presented) The system of Claim 52, wherein the biphasic electrical stimulation signals are negative/positive going.

Claim 82 (previously presented) The method of Claim 65, wherein the monophasic electrical stimulation signals are negative going.

Claim 83 (previously presented) The method of Claim 66, wherein the biphasic electrical stimulation signals are negative/positive going.

Claims 84-85 (canceled)

Claim 86 (new) The system of Claim 20, wherein the electrical stimulation signals are in the form of impulses having a duration in the range of about 10 to 1000μs and a current amplitude

selected to be 1-10 times a current threshold required to recruit a large diameter sensory nerve fiber without recruiting a pain nerve fiber.

Claim 87 (new) The method of Claim 60, wherein the electrical stimulation signals are in the form of impulses having a duration in the range of about 10 to 1000μs and a current amplitude selected to be 1-10 times a current threshold required to recruit a large diameter sensory nerve fiber without recruiting a pain nerve fiber, the electrical stimulation signals.

Claim 88 (new) A prosthetic limb for a patient having a limb stump to be used in combination with means for transmitting electrical stimulation signals to the selected sensory nerve fibers including a plurality of electrodes adapted for implantation in close proximity to the severed limb nerve and wherein each electrode is in close proximity to different sensory nerve fibers of the severed limb nerve, the prosthetic limb comprising:

a plurality of sensors that produce sensory signals;

a signal generator for producing electrical stimulation signals to stimulate one or more selected sensory nerve fibers of a severed limb nerve, the electrical stimulation signals approximating a pattern of sensations that would be received from a normal, innervated limb before it was amputated;

a microprocessor that receives the sensory signals and is programmed to cause the signal generator to produce the electrical stimulation signals and to deliver the electrical stimulation signals to the one or more selected sensory nerve fibers in order to provide sensations to the patient that appear to arrive from the prosthetic limb, wherein the selection of the one or more sensory nerve fibers is based on feedback from the patient regarding which sensory nerve fibers correspond to which of the plurality of sensors, the microprocessor being

programmed to cause the signal generator to produce electrical stimulation signals in the absence of sensory signals produced by the plurality of sensors in order to alleviate phantom limb pain; and

means for transmitting the sensory signals from the plurality of sensors to the microprocessor.